

What is claimed is:

1. A radio frequency (RF) signal transmission system,
comprising:

a transmission system capable of carrying RF signals from a source site to a destination site;

a termination RF load, located at said destination site;

a combining system to pass RF signals from a source site, wherein said combining system is located proximate to the source end of said transmission system, and wherein said combining system provides as an electrical output RF signals that have been reflected from loci within said transmission system; and

a test signal source, wherein the test signal from said test signal source is embedded within an RF signal stream fed into said transmission system by said source site.

2. The RF signal transmission system of claim 1, wherein the test signal from said test signal source is a swept tone superimposed on the signal transmitted on a specific horizontal line in an NTSC Television signal stream.

3. The RF signal transmission system of claim 1, wherein said test signal is an NTSC analog Ghost Canceling Reference Signal (GCR) pattern waveform used for ghost cancellation at a television receive site.

4. The RF signal transmission system of claim 1, further comprising a signal processor to identify RF signals reflected back from

irregularities within said transmission system.

5. The RF signal transmission system of claim 1, further comprising a signal processor to identify RF signals reflected back from irregularities within said transmission system, wherein each of the reflected RF signals includes a predetermined, embedded pattern of frequency variation, and wherein the pattern occurs at a time coincident in part with a previous reflected RF signal.

6. The RF signal transmission system of claim 1, further comprising a signal processor to identify RF signals reflected back from irregularities within the transmission system structure, wherein each of the reflected RF signals includes a predetermined, embedded pattern of frequency variation, and wherein the pattern occurs at a time distinct from any previous reflected RF signal.

7. The RF signal transmission system of claim 1, further comprising:

a data storage medium to capture a record of the response of said transmission system to insertion of a signal source for test; and

a data analysis apparatus to compare a first response by said transmission system to a second response by said transmission system and identify differences between the responses by said transmission system.

8. The RF signal transmission system of claim 1, further

comprising:

a data storage medium to capture an initial record of the response of said transmission system to the presence of normal signals that include a test signal source;

a data storage medium to capture a subsequent record of the response of said transmission system to the presence of normal signals that include a test signal source; and

a data analysis apparatus to compare an initial response of said transmission system to a subsequent response of said transmission system and identify changes in the response of said transmission system over time.

9. The RF signal transmission system of claim 1, further comprising:

a data storage medium to capture a record of the response of said transmission system to insertion of an RF test signal wherein said RF test signal is a telemetry pattern embedded within an RF signal transmitted by the RF signal transmission system; and

a data analysis apparatus to compare a response of said transmission system to a predetermined response of said transmission system and identify defects in the response of said transmission system.

10. The RF signal transmission system of claim 1, further comprising a warning system that compares a first characterization of an RF transmission system at a first time to a second characterization of the same line at a second time and generates warning signals if the RF transmission

system characterization deviates from the first characterization by an amount that exceeds an established threshold.

11. The RF signal transmission system of claim 1, further comprising a remote data gathering system that acquires, by telemetry, a first characterization of an RF transmission system at a first time, acquires, by telemetry, a second characterization of the same RF transmission system from the RF transmission system, stores characterization data for subsequent use, and performs such computation as may be required to analyze the physical condition of the RF transmission system and generate warning signals if the RF transmission system characterization deviates from the first characterization by an amount that exceeds an established threshold.

12. The RF signal transmission system of claim 1, further comprising a remote data gathering system that:

acquires, by telemetry, a first set of characterization data for a multiplicity of RF transmission systems at a first set of times;

stores characterization data for subsequent use;

acquires, by telemetry, a second set of characterizations of the same multiplicity of RF transmission systems at a second set of times;

performs such computation as may be required to analyze the physical condition of the RF transmission systems; and

generates a warning signal at such time as a second RF transmission system characterization deviates from the RF transmission system's first characterization by an amount that exceeds an established threshold.

13. A combined RF signal transmission and test apparatus comprising:

means for directing an RF signal from an RF signal source to an RF load;

means for producing a test signal embedded within the stream of an RF signal; and

means for detecting energy from an RF signal reflected back from said means for directing an RF signal.

14. The RF signal transmission and test apparatus of claim 14, further comprising:

means for recording initial propagation characteristics of the means for directing an RF signal;

means for recording subsequent propagation characteristics of the means for directing an RF signal; and

means for comparing recorded characteristics acquired at different times.

15. The RF signal transmission and test apparatus of claim 14, further comprising means for recording comparisons between recorded characteristics acquired at different times.

16. The RF signal transmission and test apparatus of claim 14, further comprising means for displaying results of comparisons between

recorded characteristics acquired at different times.

17. The RF signal transmission and test apparatus of claim 14, further comprising means for identifying causes for differences between recorded characteristics acquired at different times.

18. The RF signal transmission and test apparatus of claim 14, further comprising means for predicting further changes in recorded characteristics.

19. A method of testing an RF signal transmission apparatus comprising the steps of:

transmitting an RF signal that includes an integral RF test signal into an RF transmission system;

receiving reflections, if present, of the RF test signal from the RF transmission system with a combining system located proximate to the end of the transmission system at which the transmitter is located;

processing the received reflections to establish a first pattern of time intervals from the original RF test signal to each reflection; and

comparing the first pattern of time intervals of received reflections to a second, predetermined pattern thereof.

20. The method of testing an RF signal transmission apparatus of claim 19, further comprising the step of storing the first pattern of reflections as a characterization of the transmission system at a point in time.

21. The method of testing an RF signal transmission apparatus of claim 19, further comprising the step of displaying the first pattern of reflections.

22. The method of testing an RF signal transmission apparatus of claim 19, further comprising the step of characterizing an RF transmission system in the form of a record of reflection magnitude versus distance as established by the magnitude and location of reflections generated by the line in response to an RF test signal.